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VOL. XXXVII DECEMBER, 1954 NO. 4

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A CONSIDERATION OF SOME INFLUENCES AFFECTING ENTOMOLOGY [1]

D. O. WOLFENBARGER
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Let us give some consideration to influences occurring inside and outside the field of entomology. There is a cause for every event that happens and that influences entomology as a result. Let us think of the significance of events rather than listing them.

Entomology is a minor part of present day human endeavor but it is subject to influences by all other pursuits. It is essential for those in each endeavor to contact those in other fields and each is, in turn, influenced by others. Outside influences should be looked for and invited as sources of possible advances in the field. Although workers in the various disciplines will not be able to control directly the influences contacting them they are responsible for their reactions to the events. For instance, influences outside of entomology from about 1942 to 1945 (World War II) prevented the importation of much-needed pyrethrum and rotenone. Entomologists were asked for and gave, recommendations to control insects in spite of these shortages.

Public trust is placed on those people working in entomology as in other professions. There are definite and unavoidable responsibilities which must be accepted; there are definite and far-reaching degrees of accountability and the public must have recompense for its trust. I believe entomological projects, for example, must render equivalent or greater service to man than they receive in order that they may endure.

Early entomological workers were amateurs who received their food, clothing and shelter from employment outside their interests in insects. Many of these were clergymen, lawyers, physicians and other professional workers. Also, occasionally some of the "leisure class" collected and observed insects as hobbies. A very small portion of mankind always has been sufficiently intrigued by insects, their form and coloration to study them without expectation or desire for remuneration. Many in this group are classified as "collectors" by students of psychology. Entomological histories are replete with accounts of these early workers. Undoubtedly the philosophies, methods

[1] Presidential address, thirty-seventh annual meeting of the Florida Entomological Society, Bradenton, September 2, 1954.

and procedures of present day entomologists were at least influenced, if they were not made possible, by the avocational efforts of these pioneers. Search for details and scientific exactness, for example, may have been an influence contributed by physicians. Theologists and teachers through their studies of insects influenced early entomologists, and hence all entomologists.

An event that was of much significance in early entomology was the manufacture of the microscope. From its invention until today, the microscope has been an essential tool of the entomologist. It enables a determination to be made of the species with which one is dealing. What progress, in fact might have been made without it? Yet entomology is not known to have influenced its invention!

Chemistry has undoubtedly affected entomology as much or more than it has any other human endeavor. It is impossible to estimate the extent to which chemical discoveries have influenced all phases of entomology. We must look to chemistry to provide future insecticides and other materials for use by economic entomologists. Chemistry, however, has also been influenced by entomology. Silk, honey, beeswax and shellac are widely used in various ways and have provided chemists with products which they have used in many ways.

People become interested in insects for various reasons. Some become so intrigued with insects and insect life that they become life workers from interest. Others choose entomology after having looked over many fields of study. Some are in the occupation because of opportunities for life work, some because they would have to exert themselves greater in other lines of work. Influences from within and without entomology, therefore, induce people to become entomologists. Amateur entomologists are needed since there is much about insects and insect life in Florida and elsewhere that may be discovered by them.

An important item influencing entomologists is gain or compensation of some form such as money, personal satisfaction or approval of work by friends. Except for personal satisfaction all other forms of compensation are dependent on pleasing others.

Public support is sufficient in Florida and the states of the Union to care for hundreds, if not thousands, of entomologists. The number supported may be taken as a measure of satisfaction to the public. Based on the 1950 population census figures and current membership in the Cotton States Branch of the Ento-

mological Society of America there is one entomologist per 17,213 population in Florida. This compares with one entomologist per 70,869 population in the other States of the Cotton States Branch of the Society. This figures to over four-fold more entomologists per capita in Florida than in adjoining or nearby states.

Acts of Congresses of the United States have produced significant influences over the entomological profession. More entomologists are supported by federal funds than by those of any other organization in the world. Sources of influence for provision of these funds have stemmed from insect outbreaks or threatened invasions.

Support for colleges and universities must come from the general public or from private sources in some manner. This support depends for the most part on the economic status of the people. Insect pests having economic importance are usually and basically responsible for many projects on which the entomologist works. Activities by influential leaders secure funds for control efforts to alleviate losses from insect pests. An entomologist is expected to help solve economic problems although, it is usually possible by dint of hard work for an entomologist to do his required tasks and to engage in projects of his choice, which may include taxonomic studies in some group.

Political pressure is a factor with which the entomological and other professions must reckon. It appears to be a requisite or a result of our form of government. It is not necessary, however, for entomologists to "play politics". Political activity is, moreover, usually forbidden by those administrators responsible for the activities of entomologists.

Within the last decade increasingly greater numbers of entomologists have been employed in industrial capacities. These entomologists have influenced their co-workers in industry and management and they have also been influenced. These influences have been mutually beneficial to all concerned. Except perhaps for a few opportunists "out to make a fast buck", industrial entomologists in Florida are maintaining high ethical standards. Relationships between entomologists employed by industry and by governmental agencies, in fact, are most wholesome. May they always remain so!

We should occasionally look for and inquire about any sinister influence that is menacing entomology today. In doing so, let us remember that past happenings are reacting to give

present-day occurrences, and that today's events are shaping tomorrow's future. In looking for danger signs we may see that man's selfishness is undoubtedly the greatest menace to future happiness of entomologists and also all others. Selfishness exists between individuals and between groups in all professions and human activities. Suspicion, greed, hatred and half-truths exist in governments and between governments. Peaceful relationships will exist where there is no oppression of man and where the majority rules. Violent destruction may engulf society unless greater understanding and cooperation produce friendly relationships. Such destruction may reduce human life to sparse populations in unorganized groups living by day-to-day existence.

An objective of all entomologists should be "service to others". This should be true whether one considers himself an "economic", "industrial", "systematic" or other kind of entomologist. It should be true whatever influence may originate from any human endeavor.

Our profession today is held in high esteem by the general public. Our services are sought; our recommendations are accepted. These results are influenced, in part, by our pioneer entomologists. Let us remember, with a great deal of humility, how they struggled that we might have a more complete knowledge of insects. If we strive to uphold their objectives, we may rest assured that the entomological profession will remain active, vigorous and productive throughout the future.

NOTES

NEW DRAGONFLY RECORD FOR THE UNITED STATES.—Recently while examining a few undetermined Odonata in the collection of Dr. C. Francis Byers at the University of Florida, I found a male of *Idiataphe cubensis* (Scudder) collected by Dr. Lewis Berner in Miami, Florida, July 28, 1937. As far as known this represents the first record of this genus from the United States. Since the wings are in perfect condition it seems likely that this specimen emerged in Florida, and that the species was established in the Miami area. *Idiataphe* (formerly *Ephidatia* Kirby) is a small tropical American genus of two species; Ris (1913)[1] recognized only one species with two subspecies. *I. cubensis* has been recorded from Tamaulipas in Mexico, Cuba, Jamaica, Puerto Rico, Bahamas, and south to Colombia and Peru. *I. longipes* is Brazilian.

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[1] Ris, F., 1913. Collections Zoologiques du Baron Edm. de Selys Longchamps. Catalogue Systématique et Descriptif. Fasc. XVI. Libellulinen 8. pp. 965-1042.

GRANULAR INSECTICIDAL BAITS AGAINST FLIES

HERMAN S. MAYEUX [1]

This is a report of some of the field and laboratory tests conducted during 1953 and 1954 as part of the development of an entirely new and different approach to house fly (*Musca domestica* L.) control. The product resulting from this research is known as "FLY FLAKES" and patents have been applied for.

The objective of this project was to develop a dry granular bait that could be scattered by hand (with a rubber glove); by means of a shaker can; or applied with ordinary dusting equipment. Also, it should be effective against both larvae and adult house flies for periods of several days or longer, and sufficiently stable to lend itself to packaging and marketing in ready to use form.

Sixty-seven different formulations of dry granular baits have been field tested. A wide variety of inert granular materials have been used having absorbed or adsorbed thereon various combinations of attractants, dispersants, stabilizers, other adjuvants and various concentrations of toxicant. Malathion (o,o-dimethyl dithiophosphate of diethyl mercaptosuccinate), as technical grade, wettable powder or emulsifiable concentrate was used in the preparation of all the granular formulations used in tests reported here. Concentrations of 1% malathion were usually used as the result of work with blackstrap baits as reported earlier (1954), however, higher concentrations were tested against larvae.

COMPARISONS OF INERT GRANULAR CARRIERS

Among the wide variety of inert granules tested, those that showed promise were ground shell of the bivalve (Mollusca, class Lamellibranchia), marble, granite, quartz, expanded mica (Vermiculite), granular bentonite and granular attapulgite clay (Attaclay). Ground shell was chosen for the final product, and

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[1] Entomologist, Florida Agricultural Supply Co., a division of Wilson & Toomer Fertilizer Co., Jacksonville, Florida.

The writer wishes to acknowledge assistance by Julian H. Jackson and William J. Head, Chemists of this Company, who did chemical, physical, and formulation studies; and by James R. Christie, Technical Representative of this Company, who assisted in field testing.

This paper was presented before the Florida Entomological Society, Bradenton, Florida, September 3, 1954. Some of this data was presented before The Florida Anti-Mosquito Association, Naples, Florida, on April 27, 1954.

was used in most of the experiments described in this paper. Shell has several advantages over the other inert granules named above:

Advantages of Ground Shell:

1. Specific gravity is great enough to minimize the effect of wind both during the application and afterwards, but not excessively heavy as quartz or sand.
2. Very low porosity minimizes absorption so that practically all the toxicant, attractants, and other ingredients are adsorbed onto the surface and are readily available.
3. The flat shape of the granules increases resistance to movement by the wind or other forces after application and increases flotation on surfaces such as the ground, manure or litter.
4. Light color (white or grey) is easy for the user to discern in controlling the application and serves as a safety feature to reduce accidental contacts with treated surfaces.
5. Traction under foot is increased on smooth surfaces, such as concrete, rather than being decreased as by granules that are more easily subdivided or become slippery such as the clays or mica.
6. Shell is easily ground to whatever particle size range is desired, which may be from 100 mesh to 4 mesh.
7. The insolubility and resistance to subdivision minimized the possibility of stickiness or smears on treated surfaces.

Shell was chosen in preference to organic type granules for the same reasons as stated above.

A mixture of 10 to 20 mesh and 60 to 100 mesh shell granules was finally adopted for several reasons:

1. The larger particles made the material easier to scatter by hand than a product consisting entirely of particles of 60 to 100 mesh.
2. The larger particles were not lost or buried in sand, dirt, manure, or litter as quickly as smaller particles, thus lengthening the effective period against adult flies.
3. The larger particles were easily seen on a treated surface and therefore accidental contact was more easily avoided.
4. Smaller particles increased the total number of particles deposited per square inch providing greater opportunity for contact with either adult or laval stages.

EQUIPMENT AND METHODS

Field tests were conducted in dairy and livestock barns, poultry houses, hog pens, garbage dumps, filling stations, retail stores, around garbage cans, on unscreened porches and patios,

around food processing buildings and in other areas where flies congregate or breed.

Adult Control Data: Infestation records of adult flies were made with a square template one-fourth inch thick and framing an opening 12 inches by 12 inches. The template itself had an area of one square foot, the template frame being 2.486 inches wide on all sides of the one square foot opening. In making fly counts it was customary to toss the template onto the floor or ground, wait a few seconds for flies to settle, then count the active flies resting on the template itself and the dead and affected flies on the one square foot area framed by the template. The number of points at which this count was taken depended upon the area involved and the uniformity of the fly population within the area, usually ten to fifteen points. The counts were usually taken before an application was made and at various intervals thereafter.

Larval Control Data: To make population and mortality counts of larvae an ordinary gardener's trowel was used to take small sub-samples of manure from five to ten obviously infested points in each plot, being careful to take manure to a depth of two to three inches. Five sub-samples totaled one pint. For larger plots ten sub-samples (one-quart) were taken. Shallow one-quart coffee cans were used for handling the samples. A wooden frame fifteen inches square, made of 1 x 4 inch lumber and with the bottom covered with sixteen mesh screen wire was used for holding the sample while making the counts. A piece of heavy paper six inches square placed between the sample and the screen prevented live larvae from escaping through the screen. A fine spray of water and hand manipulations with the trowel served to expose the larvae on the screen so that they could be counted and recorded as dead or alive. First instar larvae were never observed or counted.

The usual procedure was to make a pre-application count of larvae and post-treatment counts at periods varying from three to fourteen days after the application.

Most of the larval control tests were in caged laying hen houses. The cages ran full length of buildings 40 to 160 feet long, and there were three or four cages per building suspended 3 to 4 ft. above the ground. The area covered by manure under the cages was from 2½ ft. wide for single tier cages, to 4 ft. for double tier cages. Plot areas varied from one square yard to the entire area under a cage in the various experiments.

Replicates of treatments were varied from one to three depending upon the infested area available for use.

PRELIMINARY FLY CONTROL TESTS

Small scale tests against house fly larvae in decaying garbage showed that 5 percent malathion on 30 to 60 mesh Attaclay applied at the rate of one pound per 100 sq. ft. was very effective and killed a high percentage of the larvae within one to three days. Two applications of this material applied seven days apart to a truckload of fresh chicken feathers and entrails practically eliminated the development of blowfly larvae; whereas, an untreated load of similar material was reduced to about one-half its original volume in fourteen days by the fly larvae feeding therein.

A small number of adult flies of various species invariably died within a few minutes following an application as the result of contact with the insecticide on the granules.

When the granules were baited with various substances flies fed readily and began dying in from one to five minutes, usually about three minutes.

CRUTCHER POULTRY FARM EXPERIMENT

The Crutcher Poultry Farm consisted of a caged hen house 70 feet long housing four cages running parallel the length of the house. The experiment was begun on August 3, 1953, when the fly population averaged 65 adults per square foot and 1800 to 3000 larvae per quart of manure. During the seventeen weeks that followed, granular baits were used a total of nine times on the manure against both larvae and adults with a tenth application against adults only on November 30.

Table 1 shows the dates of application and the average number of adult flies per square foot before and at intervals following each application.

Table 2 has the larvae control data and other pertinent information. Plot sizes varied from 100 sq. ft. to the area under an entire cage.

Discussion: As shown in Table 1, the adult fly population was reduced initially from 65 to 3 flies per square foot in less than two hours, a reduction of 95% despite heavy pressure of newly emerging adults from pupae. The formulations killed flies within three minutes and continued to kill, reducing the

TABLE 1.—AVERAGE ADULT HOUSE FLIES PER SQUARE FOOT IN CAGED HEN HOUSE FOR SEVENTEEN WEEKS PERIOD DURING WHICH GRANULAR MALATHION BAITS WERE APPLIED TO THE MANURE TEN TIMES.*

Dates Applied**	Pre-Treatment	1 to 2 Hours			5 to 7 Days			14 Days	21 Days
		Dead	Down	Active	Dead	Down	Active	Active	Active
August 3	65	210	6.5	3.0	370	0.3	1.0	—	—
August 10	1	—	—	—	—	—	3	—	—
August 17*	3	—	—	—	—	—	4	—	—
August 24	4	—	—	—	—	0.1	0.1	0.3	5
September 14†	5	6	0.1	0.4§	14	0.0	0.3	1.5	3.6
October 5	4	—	—	—	—	—	0.6	—	—
October 12* ‡	0.6	—	—	—	—	—	—	2.0	—
October 26*	2	—	—	—	—	—	0.9	—	—
November 3	0.9	—	—	—	—	—	0.2	—	1.0
November 30	1.0	—	—	—	—	—	0.2	—	—

* Malathion content 1% except Aug. 3, 10 and 17 also used 2½% malathion. By Aug. 17 malathion contents considerably reduced by incompatibility. Oct. 12 and 26 used 0.6% malathion or lower, also result of incompatibility.

** Application rate 1½ lbs. per 100 sq. ft. of manure area unless otherwise indicated.

† Rate Sept. 14 was 1 lb. per 100 sq. ft.

‡ Rate Oct. 12 was 3 lbs. per 100 sq. ft.

§ Count actually made 30 minutes after application.

TABLE 2.—AVERAGES OF HOUSE FLY LARVAE PER QUART OF MANURE IN CAGED HEN HOUSE FOR FOURTEEN WEEKS DURING WHICH GRANULAR MALATHION BAITS WERE USED ON THE MANURE NINE TIMES.

Dates Applied	No Replications		Day Examined	Average Larvae per Quart of Manure							
				Dead	Alive	Dead	Alive	Dead	Alive	Dead	Alive
August 3*		4 Formulations:				G-1 (1%)		G-2 (2½%)		G-2 (1%)		G-2 (2½%)	
	1		3rd.			1800	40	1600	60	2100	100	2800	150
August 10			7th.			3	12	3	14	9	10	3	0
August 17			7th.			5	100	10	125	25	100	20	160
Augus 24		4 Formulations:		CK		G-5		G-6		G-7		G-8	
	1		7th.	0	150	125	15	150	25	30	100	175	0
September 14		3 Formulations:		CK		G-13		G-17		G-18			
	1		4th.	0	398	0	62	0	0	0	0		
			7th.	0	19	1	0	0	0	1	52		
			14th.	0	2	—	—	—	—	0	24		
October 5		2 Formulations:		CK		G-19		G-21					
	3		Pre-Appl.	0	249**	—	—	—	—				
			7th.	0	64	14	48	7	5				
October 12	3		7th.	0	77	12	40	16	56				
October 26		2 Formulations:		CK		G-21 (10/16)		G-21 (9/30)					
	3		7th.	0	305	1	136	3	226				
November 3		5 Formulations:		CK		G-21 (10/16)		G-25		G-26		G-32	
	2		6th.	0	286	10	72	6	112	48	49	12	76

* Figures for these dates are estimates. All other data by actual count.

** This pre-Application record taken at random through entire house.

See Table 1 concerning reduction of malathion in various applications as result of incompatability with various ingredients used.

population to a very low level, until the fifth day. Between the fifth and seventh days the population rose to approximately one fly per square foot.

There was no apparent difference in effectiveness against larvae between the one percent and 2.5 percent malathion baits used in the first three applications (Table 2). However, the 2.5 percent formulation was not as attractive to the adults as the 1 percent formulation. Incompatability of the malathion with certain ingredients reduced the control of both adults and larvae following the August 17 application.

Malathion decomposition resulting from improper packaging reduced the kill of larvae following the October 12 and October 26 applications. In spite of these troubles there were three periods of three weeks each during which no applications were needed.

The hens were not especially excited whenever granular baits were applied; however, when a three-gallon pneumatic sprayer was used to apply a spray to two plots the hens became extremely excited. Five of the hens managed to break open the doors to their individual cages and escaped. One hen killed herself fighting to escape.

On September 14, three weeks after the fourth application, there was a moderate infestation of larvae of a soldier fly, *Hermetia illucens* (L.).[2] There was an average of 51 soldier fly larvae per quart sample of manure. Four days after the application there were 83 dead and nine live larvae per sample in the G-18 plots and 67 dead with 11 alive where formula G-17 was used. The untreated check had 108 larvae alive.

The owner of this hen house continued the test on a practical basis and used the granular baits as needed through the spring and summer of 1954. His method was to "spot-treat" the moist manure where larvae were present at the rate of 1 to 1½ lbs. per 100 sq. ft. every 7 to 10 days, or less often at times, and apply additional material in walkways or on the dry manure as needed for adult fly control. At no time during the 1954 fly season were there enough house fly larvae or adults present to conduct any testing of new formulations.

CAMPBELL'S EGG FACTORY EXPERIMENTS

This establishment consisted of four caged hen houses ranging from 50 to 160 ft. length plus one each pullet house, egg house,

[2] *Hermetia illucens* (L.) determined by W. W. Wirth, Section of Insect Identification and Detection, Entomology Research Branch, U.S.D.A.

and feed house and several outdoor chick brooders. The hen houses had three or four cages 2½ to 4 feet wide running parallel and full length of the buildings.

Results of various applications of granular baits against adult house flies are given in Table 3. Results of two randomized plot tests against house fly larvae are in Tables 4 and 5. Results of a randomized plot test against soldier fly larvae are given in Table 6.

Applications of four ounces per 100 sq. ft. of granular bait to the feed house and egg house floors on September 29 and October 1 destroyed several million flies (Table 3). On October 1 the floors were almost completely covered with dead flies which were swept out and another application made. Two days later, the floors were covered completely with dead flies. The flies were brushed out lightly to leave as much bait as possible. Three days later, on October 5, the floors were again covered and a total of four gallons or almost one million flies were swept from the feed room floor, an area of about 150 sq. ft. Applications of this sort were continued and these buildings made ideal "fly traps".

Flies began dying on the feed room or egg house floors within three minutes after each application of granular bait. The baits were effective for at least one week unless completely buried or swept out earlier.

During warm weather many flies would congregate on the shaded side of the buildings and under trees as well as on the manure and walkways in the hen houses and inside the feed and egg houses. During cooler winter weather the flies often congregated on the ground on the sunny side of the buildings. Counts of flies before and after several applications of granular baits in the outside areas are given in Table 3. Rates of 3 ounces or more per 100 sq. ft. gave 80 to 90 percent reduction within 30 to 120 minutes and at 2 days. Granular baits applied on the ground outside buildings continued to kill for three to seven days, depending upon the amount of rainfall and the length of time before the granules became buried. One application on the roofs of chick brooders was killing flies after twelve days of direct sunlight and two light showers of rain.

Data in Table 4 shows that one pound per 100 sq. ft. of formulation G-21 gave as much reduction of house fly larvae in five days as 2 pounds of the same formulation. There were numerous dead larvae in all treated plots. G-22 was considerably coarser than G-21 and therefore provided fewer particles

TABLE 3.—AVERAGES OF ADULT HOUSE FLIES PER SQUARE FOOT BEFORE AND AFTER APPLICATIONS OF GRANULAR FLY BAITS AT A CAGED HEN POULTRY FARM.*

Date Applied	Formula Used	Sq. Ft. Treated	Oz. per 100 Sq. Ft.	Pre-Appl. Count	30-120 Minutes			2 Days			5-7 Days		
					Dead	Down	Active	Dead	Down	Active	Dead	Down	Active
Feed House Floor:													
Sept. 29, 1953	G-18	150	4	35	—	—	—	929	13	4**	—	—	—
Oct. 1, 1953	G-13	150	4	4	—	—	—	3000	22	5†	4000	12	3**
Egg House Floor:													
Sept. 29	G-18	200	4	6	—	—	—	264	5	3.5**	—	—	—
Oct. 1	G-13	200	4	3.5	—	—	—	1250	3	2	2000	4	1
Hen House (Manure):													
Oct. 1	Several	800	24	26	33	1.5	1.5	—	—	—	155	—	0.5
Oct. 6	Several	800	24	0.5	—	—	—	—	—	—	235	—	0.3
Ground Between Hen Houses:													
Oct. 20	G-14	1500	3	7.5	12	0.4	0.5	—	—	—	—	—	—
Oct. 20	G-18	1600	1.5	4.5	9	1	2.5	—	—	—	—	—	—
Oct. 20	G-14	300	4	5.5	79‡	—	1.0	—	—	—	—	—	—
Jan. 19, 1954	G-36	1000	6	8.9	16	4	1.3	83	1.0	0.2	—	—	—
Jan. 19	G-35	800	2.8	11	16	3	1.6	68	0.8	0.3	—	—	—
Jan. 19	G-33	4100	1.8	8.1	35	2.5	1.6	78	1.3	1.7	—	—	—

* All granular baits contained 1% malathion.
** Floor swept clean this date.
† Brushed flies out lightly leaving as many granules as possible, not retreated.
‡ This count made at 5 hours.

per square inch of area treated. G-22 was not as effective as G-21 following the first application and this difference is attributed to particle size. As the result of the combination control of both larvae and adult stages the fly population was practically eliminated by two applications as indicated by the reduction of 96% in the untreated plots seven days after the second application and an average of less than 25 larvae per quart of manure in all treatments fourteen days following the second application.

TABLE 4.—HOUSE FLY LARVAE IN QUART SAMPLES OF MANURE FROM A CAGED HEN HOUSE FOLLOWING APPLICATIONS OF GRANULAR FLY BAITS AT DIFFERENT RATES.*

	Formulation Number and Rate per 100 Sq. Ft.							
	G-21 (1 lb.)		G-21 (2 lbs.)		G-22 (1½ lbs.)		Check	
Replicate No.	Dead	Alive	Dead	Alive	Dead	Alive	Dead	Alive
First Application on Oct. 1—Examined After 5 Days								
1	33	1	47	38	96	129	2	530
2	151	68	75	46	141	210	4	506
Averages	92	35	61	42	119	170	3	518
% Recovered Dead	72		59		41		0.6	
% Red. Below Ck.		93		92		67		—
Second Appplication on Oct. 6—Examined After 7 Days								
1	3	1	4	1	41	6	1	55
2	27	28	26	44	16	0	2	14
Averages	15	15	15	23	28	3	2	35
% Red. Below Ck.		57		34		91		—
% Red. in 12 Days**		98		98		99		96
Examined After 14 Days								
Averages	1	19	0	23	1	7	0	3

* The granular baits contained 1% malathion on 100 sq. ft. randomized plots. All plots 4 ft. by 25 ft.

** Compared to initial average for entire experimental area of 891 larvae per one-quart sample.

On March 27 there were sufficient larvae in spots to run a test on one square yard plots to compare seven granular formulations with an untreated check. The total treated area was small enough to assure that there would be enough adults to provide continuous oviposition on all plots. Formulation G-21 was re-

garded as a standard and the others varied from G-21 in the amount or choice of certain of the inert ingredients or in particle size of the inert carrier. Ground shell was the carrier for all the formulations in the test. The ages of the granular bait samples and results against larvae at 4 and 10 days are given in Table 5.

TABLE 5.—HOUSE FLY LARVAE PER QUART SAMPLE OF MANURE AT FOUR AND TEN DAY INTERVALS FOLLOWING APPLICATIONS OF GRANULAR FLY BAITS IN A CAGED HEN HOUSE.*

Formula Used**	Sample Age	Four Days			Ten Days		
		Dead	Active	% Reduction†	Dead	Active	% Reduction†
Check		2	207	—	0	92	—
G-18	6 Mo.	89	5	98	104	70	24
G-21	5 Mo.	109	32	85	324	9	90
G-28	5 Mo.	31	19	91	1	297	–223
G-32	5 Mo.	8	24	88	367	3	97
G-35	2 Mo.	40	33	84	3	226	–146
G-36	3 Wk.	53	23	89	40	8	91
G-44	1 Day	37	43	79	532	213	–132

* Baits contained 1% malathion.
** Rate of application, 1½ lbs. per 100 sq. ft.; plots 1 sq. yd.
† Percent reduction compared to untreated check.

Beginning on April 10 until July 27, 1954, the Campbell's Poultry Farm was used in a practical test to study the effectiveness of a granular bait (formulation G-21) directed at the adult stage only of the house fly without any control measures whatsoever being directed against larvae. The bait was used wherever flies congregated except on the manure at a rate of two to three ounces per 100 sq. ft. Applications were made whenever concentrations of adults became noticeable, which was when there were 0.5 to 1.0 adult flies per square foot at the points of heaviest concentration. Adult flies invariably died as fast as they moved into the baited areas for at least five days, usually seven days, and somtimes ten days.

During the period of this test the total amount of granular bait used was 101.12 pounds. There were 3,000 hens in the entire establishment. The average requirement was 6.74 pounds per week or 2¼ pounds per 1,000 hens each week.

Granular bait was applied at one or more points on the premises on fourteen different days during the 108 day period

of the test, an average of one application on a "spot-treatment" basis every 7.7 days.

It should be emphasized here that this test was begun with a low population of flies which was not allowed to increase. In other tests that were begun with heavy populations, larger amounts of bait were necessary initially to bring the flies under control.

SOLDIER FLY EXPERIMENT — 1954

By June 27 there was a high population of soldier fly or latrine fly larvae (*Hermetia illucens* (L.)) in puddles of liquified manure under the cages in all the laying houses. All moist areas in the four houses were treated with granular baits six times between June 27 and August 9 at a rate of 1½ pounds per 100 square feet in an effort to bring the soldier fly larvae under control and allow the excess moisture to dry from the manure. The total amount of granular bait used was 185 pounds; an average of 31 pounds each time. This included the material used in the randomized plot experiments, one of which is given below. At the end of this test period many of the puddles had dried out completely and those remaining were reduced from areas of six feet or more in length to one or two feet. The disagreeable odor caused by these larvae was only faintly detectable when the experiment was ended.

The large black adult soldier flies were observed very closely during this period. The females were seen depositing their eggs in masses in crevases in the dry manure a few inches above the moist or puddle areas. Apparently the eggs hatched within a day or two because many young larvae, about one-fourth inch long, could be found in the puddles seven days after an application. Many adults died following each application; however, the contact with the insecticide was probably limited to physical contact when the adults walked on the granules.

The soldier fly was more difficult to control than the house fly. The adults did not seem to feed upon the bait and since not more than fifty or sixty percent of the adults were killed by contact, there were always enough adults to reinfest the manure with young larvae as soon as an application became ineffective. The soldier fly larvae were larger and harder to kill than house fly larvae.

Five experimental granular bait formulations containing 1% malathion on ground oyster shell were compared to an untreated check in a randomized plot experiment having three

replicates. Four applications were made at weekly intervals beginning on July 20. The granular baits were applied at 1½ pounds per 100 sq. ft. to plots two square yards in area.

The data in Table 6 give the results of this test. The percent control was calculated according to Abbott (1925), converted to angles as given by Bliss (1937) and minimum significant differences computed. All of the granular baits reduced the larval population significantly below that of the untreated checks. Of greater significance than the data in the table was the fact that most of the treated plots were practically completely dried up at the end of the experiment; whereas, the puddles in the untreated checks had increased in size and in two of the three plots had burst out into the walkways between cages as the larvae mined literally through the droppings. The data do not represent the full amount of reduction obtained because as the puddles became smaller the samples were taken from the remaining liquid area where the larvae tended to concentrate.

TABLE 6.—PERCENT CONTROL AND MEAN ANGLES FOR SOLDIER FLY LARVAE PER ONE PINT SAMPLES OF MANURE IN RANDOMIZED, 3-REPLICATED EXPERIMENT IN CAGED LAYING HEN HOUSE USING GRANULAR BAITS, GROUND OYSTER SHELL BASE, 1% MALATION.

Treatments	Av. Larvae per Pt. Before Application	1st Application After 3 Days Percent Control	1st Application After 3 Days Mean Angle	1st Application After 7 Days Percent Control	1st Application After 7 Days Mean Angle	4th Application After 7 Days Percent Control	4th Application After 7 Days Mean Angle
Untreated	118	0	0	0	0	0	0
G-21	146	79.9	67.9	73.4	65.5	65.3	55.4
G-49	110	93.4	77.6	91.8	73.7	55.7	48.9
G-21 (stored 9 months)	122	80.0	63.9	41.2	30.2	76.7	62.3
G-53	98	97.3	80.9	94.7	79.5	88.7	72.2
G-59	159	87.3	70.2	84.9	63.7	53.3	47.6
L.S.D. .05			20.0		33.2		28.3
L.S.D. .01			28.5		47.2		40.2

Records were made of the length of time that was required to apply the granular baits at the two poultry farms and at six others where practical tests were conducted. When compared to the time the owner used to apply liquid insecticides against larvae with either a sprinkler can or sprayer, the saving in time by using granular baits was at least 50 percent. The granular

baits appealed very much to the cooperating poultrymen because no equipment was needed, no mixing or preparation of any kind was necessary, the hens were not disturbed appreciably, and no moisture was added to the manure to encourage subsequent fly breeding.

DAIRY BARN EXPERIMENTS

In tests conducted in nine dairies during 1953 applications of three to four ounces per 100 sq. ft. of granular baits containing 1% malathion to the feed room floors and other areas where flies congregate gave 90 percent or higher reduction of flies in 30 to 60 minutes when the initial populations were high (15 or more per sq. ft.) and 30 percent or more reduction of low populations (less than one per sq. ft.). One to four pounds was sufficient for most barns, including the feed rooms, milking area, and areas near the buildings where flies congregated.

The feed room floors served as excellent traps for flies for periods of 3 to 7 days following an application. Most of the flies at several of the barns entered the feed room during the day, being attracted by the feed. The baits continued to kill until covered by wasted feed, dead flies, and other refuse at which time the floors were swept and baits reapplied. Floor sweepings were not fed to livestock.

TABLE 7.—AVERAGES OF ADULT HOUSE FLIES PER SQUARE FOOT BEFORE AND AFTER APPLICATIONS OF GRANULAR FLY BAITS IN DAIRIES.*

Date and Area Treated	Formula Used	Pre-Appl.	30-60 Minutes			2 to 6 Hours		
			Dead	Down	Active	Dead	Down	Active
August 14								
Feed Room	G-3	15	10	0.3	2.5	25	1.5	3.0
August 14								
Milking	G-3	—	—	—	—	11	—	—
August 31								
Outside	G-4	—	—	—	—	34	2.2	0.7
September 3								
Feed Room	G-16	6	15	1.6	0.7	—	—	—
September 14								
Feed Room	G-18	20	84	2.6	0.9	—	—	—
Milking	G-18	1	3	0.0	0.3	—	—	—
Milking	G-17	0.9	4	0.3	0.3	—	—	—
October 19								
Milking	G-18	1.3	7	0.9	0.8	—	—	—

* All granular baits contained 1% malathion applied at 3 to 4 oz. per 100 sq. ft. where flies congregated.

Applications were made in the milking areas when needed for an immediate knock down; however, most of this material was removed the same day by the routine washing procedure. Window ledges and similar dry locations in the milking area served well as bait stations, and flies died at such locations for at least five days and up to 21 days.

Flies in one barn were held at a low level by using various of the granular bait formulations a total of only nine times in nine weeks. Fly control data following eight applications in various barns are presented in Table 7.

A survey was conducted of fifteen dairies in Duval County, Florida, in early August, 1954, to determine the amount of the granular bait required to control flies over a period of twelve weeks. Amounts used in 12 weeks ranged from 8 to 15 pounds or about one pound per week. Most of the dairymen made two applications the first week and one about every 5 to 10 days afterwards.

ATTRACTIVENESS TESTS [3]

Attractiveness tests were made in a manner similar to that reported by Gahan *et al* (1954). Granular baits containing one percent malathion were compared to a granulated sugar bait carrying one percent malathion by weight from wettable powder.

Flies used in tests of nearly 40 granular formulations were 4 to 6 days old and of a strain resistant to DDT. Three granular baits and the granulated sugar bait were exposed in petri dishes in positions about one foot apart forming a square. Flies were allowed a few seconds to settle before counting. Then the flies were disturbed and the baits were rotated one position clockwise for a total of four such counts. The test was done during both morning and afternoon with different flies in the room each time. Table 8 gives the attractiveness ratio of nine selected granular baits, all of which were more attractive each time tested than the standard sugar bait.

MISCELLANEOUS TESTS

On August 20, 1953, an area of 500 sq. ft. on a garbage dump was treated against larvae and adults using 1½ lbs. of formulation G-3 (1% malathion) per 100 square feet. Adult flies began

[3] These tests were conducted with the cooperation and assistance of W. C. McDuffie, J. C. Keller, and other U.S.D.A. personnel using facilities at the U.S.D.A. Research Laboratory, Entomology Research Branch, Orlando, Florida.

feeding immediately and began dying within three minutes. A heavy rain fell after fifteen minutes which reduced the killing of adult flies. The site was examined after three days. The surface of the decaying garbage was completely covered by dead larvae and there were dead larvae to a depth of over three inches. There were almost no live larvae found. Several tests of this kind were conducted, with similar results.

TABLE 8.—ATTRACTIVENESS RATIO OF SELECTED GRANULAR FLY BAITS TO GRANULATED SUGAR - MALATHION BAIT.*

Formula	Sample Age in Weeks	Attractiveness Ratio** Morning	Afternoon
G-18	31	310	318
G-18 A	30	145	263
G-21	27	2600	105
G-21 A	30	600	162
G-25	27	536	193
G-28	27	172	228
G-32	25	119	172
G-42	1 Day	106	168
		118	
G-43	1 Day	241	141

* All formulations contained 1% malathion.

** Attractiveness ratio equals number flies attracted to the experimental bait divided by number attracted to the standard bait multiplied by 100.

Personnel in an office building used a teaspoonful of granular bait in ash trays to kill flies that entered the offices. Some of the bait was also scattered upon the window sills and similar places. Baits used in this manner were effective for over three weeks without replacement.

Several grocery stores, feed and seed stores, service stations, and similar buildings were baited at different times by applications to the floors and to the outside garbage and trash disposal areas at rates of 4 ounces per 100 square feet against adults and 1 to 1½ lbs. against adults and larvae. The applications were very satisfactory both inside and outside the buildings and continued to kill for several days, or as long as the granules were accessible to the adult flies.

The granular baits were used conveniently and effectively around the entrances, holding pens and waste bins at six different meat processing buildings, three for poultry, one for swine, and two for beef cattle and swine.

Applications around outside barbecue pits, picnic areas, outside recreation and carnival areas have been most effective, giving satisfactory reductions of adults within thirty minutes in most instances.

Outside porches and patios of residences, floors of drug stores, and retaurants, areas around garbage cans, pig pens, livestock barns with litter or manure floors and many similar areas have been treated successfully on numerous occasions.

Granular fly baits were applied on several occasions for adult fly control with a rotary hand duster. At ordinary operating speed with the outlet wide open the duster delivered a very even application at the rate of three to four ounces per 100 square feet. Tests have not been conducted with power dusters or airplane dusters but there seems no reason why such equipment cannot be used if desired.

Hens and ducks fed on the particles reluctantly, but if starved for grit did consume small amounts. It is assumed that other poultry would do likewise. For this reason the end product of this research should not be applied within reach of poultry. Its use in houses or pens where poultry are on litter or on the ground is limited to such places as inside screened manure pits, on overhead shelves or window ledges, feed rooms, areas outside the enclosures and other places not within reach of the poultry, which is usually sufficient. The granular bait was used alone with satisfactory results in several poultry houses in North Carolina limiting the use to these restricted locations.

At least ten species of flies have been observed to feed upon the granular baits and die. A collection of flies was made in a dairy barn at the University of North Carolina campus on May 18, 1954, following an application of these baits. Flies were collected as they became unable to walk and fly following actual feeding upon the bait. Identification of the species, as determined by C. W. Sabrosky, Section of Insect Detection, Entomology Research Branch, U.S.D.A., follow:

Muscidae:

Musca domestica (L.) (house fly)
Orthellia caesarion (Mg.)
Fannia canicularis (L.) (little house fly)
Paregle cinerella (Fall.)

Calliphoridae (blow flies):

Phaenicia sericata (Mg.)
Callitroga macelaria (F.)
Phaenicia cuprina (Wd.)

SUMMARY

Tests were conducted in 1953 and 1954 in the Florida-Georgia area in the successful development of a ready-to-use, granular fly bait that can be distributed by hand, with the protection of an ordinary rubber glove, without the use of application equipment of any kind, or can be applied with a shaker can or by ordinary dusting equipment. Numerous granular carriers were tested, of which ground shell was selected having a particle size range of 4 to 100 mesh (Tyler designation). The granules were coated with attractants, other adjuvants and toxicant (1% malathion) and were found to be highly effective against both adults and larvae of the house fly and related species, and effective against larvae of a soldier fly, and blow fly larvae. The final product was stable on prolonged storage in suitable containers and is being marketed under the trade name "FLY FLAKES". The product is practically odorless. Patents are pending.

Tests were conducted in numerous locations where flies breed or congregate. Three to four ounces per 100 square feet scattered by hand, reduced adult fly populations ninety percent or more within one hour with high mortality continuing for periods up to three weeks or longer in situations that permitted the particles to remain dry and exposed within reach of the flies. In situations such as feed room floors, on the manure under caged hens, and on litter of livestock barn floors, the baits usually gave an initial reduction of at least ninety percent within an hour and held the flies at this level or lower, killing flies as fast as they moved into the area, for periods of three to seven days.

In tests against house fly larvae and adults at two poultry farms the granular baits applied to the manure gave this same rapid reduction of adult flies at rates of one to 1½ lbs. per 100 square feet and continued to kill flies as rapidly as they emerged from pupae or moved into the treated area for periods of 5 to 7 days. These rates also killed a very high percentage of the larvae to a depth of three inches in the manure and gave reductions in larvae up to more than ninety percent in 3 to 7 days. Both larvae and adults were reduced ninety-eight percent or more following two applications 5 to 7 days apart.

Flies were reduced and kept under good control in one poultry house during a seventeen week period by using nine applications against larvae and adults and a tenth "spot" application against adults only.

Flies in caged hen houses were brought under control by three different methods: First, by treating all of the manure at 1 to 1½ lbs. per 100 square feet once or twice at weekly intervals, plus treating areas where flies congregate such as feed-room and egg house floors with 2 to 4 ounces per 100 square feet and continuing this procedure as needed. Second, by spot treating areas of manure obviously infested by larvae and applying additional material about the area where needed to control adults. Third, by ignoring the larvae entirely and concentrating on adults in areas wherever they congregated with applications when needed. Of these methods the second was entirely satisfactory. The third method was satisfactory for the house fly but permitted larvae of a soldier fly to increase.

Larvae of a soldier fly were controlled very effectively in manure under caged hens by weekly applications to infested areas at the rate of 1½ lbs. per 100 sq. ft. However, not more than 50 to 60 percent of the adult stage was killed and then apparently by contact rather than by baiting.

During a fifteen week period, April-July, the average amount of granular bait required to hold adult house flies at a very low level at a poultry farm having 3,000 caged laying hens was an average of 2¼ pounds per 1,000 hens per week.

Tests in dairy barns using 2 to 4 ounces per 100 square feet on the feed-room floors, in walkways, and other areas where flies congregate reduced flies 90 percent or more within an hour. One to four pounds was sufficient in most dairy barns and, because the bait continued to kill when used in the feed rooms, on window ledges, and other dry surfaces, applications to limited areas every 5 to 10 days were usually sufficient.

The granular baits were highly effective in livestock barns and hog pens on litter or manure covered floors, on outside porches of residences, in commercial buildings such as office buildings, stores, and a cafeteria, around meat processing plants, barbecue pits, picnic areas, garbage dumps, and similar locations.

Dogs, cats, hogs, horses, and cattle were watched on numerous occasions and at no time did any of these animals show any interest in the granules or any inclination to feed thereon. Chickens and ducks fed upon the baits reluctantly and care must be taken against possible poisoning of poultry.

In general, the product has proven to be an excellent tool for killing both larvae and adult stages of house flies and several other species of flies, and larvae of the soldier fly in practically any area or location except inside residences, in milk processing

rooms,[4] in areas accessible to poultry and where hard granules may scratch highly finished floors by being trodden under foot.

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[4] Malathion is not approved for use inside residences and milk processing rooms at this time.

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REPORT ON A COLLECTION OF MALLOPHAGA, LARGELY MEXICAN (PART I)

M. A. CARRIKER, JR.

(Continued from p. 146, Vol. 37, No. 3)

Superfamily ISCHNOCERA

FAMILY PHILOPTERIDAE

Acidoproctus hopkinsi mexicanus, n. subsp.

(Figures 8 and 9)

Types, male and female adults, from *Dendrocygna a. autumnalis* (Linn.), collected by Charles Shaw at Tamuín, San Luis Potosí, September 19, 1946.

DIAGNOSIS.—Closely related to and conspecific with *A. hopkinsi* Carriker,[1] from *Dendrocygna autumnalis discolor* of Colombia. It differs from *A. h. hopkinsi* in the following characters: the frontal emargination of the head is closed apically by the drawing together of the tips of the *frons*, so that they touch each other (see figure).

In *hopkinsi* there is a slight tendency towards this closing of the emargination, the sides of the opening not being parallel-sided as in *rostratus* and others of the genus.[1] The pre-antennary portion of the head in *mexicanus* is wider than in *hopkinsi*, and there are slight, differences in the structure. The entire insect is smaller in most measurements than *hopkinsi*, the exceptions being in the length of the pterothorax, which is the same in the male and greater in the female, and in length of the antennae which are longer in both sexes.

The chaetotaxy of the sternal genital plate in the female and the structure of the sclerite itself are also different (compare figures of the two).

MEASUREMENTS OF THE TYPES:

	Male		Female	
	Length	Width	Length	Width
Body	3.17	—	3.73	—
Head *frons*	—	.49	—	.51
Head temples	.825	.64	.825	.651
Head emargination	.175	.13	.174	.152
Prothorax	.29	.347	.282	.41
Pterothorax	.434	.67	.423	.705
Abdomen	1.95	.684	2.49	.868
Antennae	.40	.068	.326	.06
Basal plate	.175	.13		
Paramers	.163	.105		
Endomera	.13	.06		

[1] Proc. U. S. Nat. Mus., 1949, vol. 100, pp. 377-380.

In *mexicanus* there are 13 heavy spines on each side of the genital plate instead of 9 as in *hopkinsi*, and the spines are thicker, while there is an additional row of about 10 very short and thick spines just inside the long ones, instead of the row of fine setae further inside as in *hopkinsi*. The basal plate in the male is shorter and wider and the paramers are the same in both measurements, but the endomera are shorter and wider and slightly different in shape. There are *two* setae at the tip of each paramer instead of one as in *hopkinsi*.

There is a slight error in the figure of the endomera as given for *hopkinsi*, the lateral emarginations being covered by a very thin, transparent membrane, as in *mexicanus*.

The species is represented by the male holotype, female allotype, and 1 male paratype; the last is now in the collection of the author.

Anatoecus bipunctatus (Giebel), 1874

Docophorus bipunctatus Giebel, Insecta Epizoa, p. 116. Host: *Mergus* (*m.*) *merganser* (Linn.).

Three males were taken from a specimen of *Mergus merganser americanus* Cassin, collected by George H. Lowery, at Lawrence, Kansas, U. S. A., November 7, 1946.

While the type of this species came from the European Merganser, the two are very closely related. I have examined specimens of *Anatoecus* from numerous species of American ducks, and specimens from different genera of ducks are often extremely similar. Apparently there has been very little differentiation in this parasite with the evolution of the numerous genera and species of ducks. Taking this fact into consideration, I feel that I am warranted in calling the present specimens of *Anatoecus* the same as those from the European Merganser, although I have not been able to compare them directly with European material.

Austrophilopterus minutus Carriker, 1950

Rev. Brasil Biol., vol. 10, p. 186, figs. 44-46. Host: *Aulocorphynchus p. prasinus* (Gould).

A series of 1 male, 4 females, and 3 nymphs were taken on the type host, collected by Robert J. Newman at Xilitla, San Luis Potosí, February 7, 1947. These have been compared with the types of the species and are the same. In the collection there is also a nymph of this species labelled as from *Vireo solitarius*, collected on February 8. This is an obvious straggler from a Toucan collected the previous day. There is also another adult female labelled as coming from *Psilorhinus morio*, collected at the same place on February 14. This is also an obvious straggler from the Toucan, most likely being accidently mixed with the material from *P. morio* during the process of mounting.

Cummingsiella inexpectata, n. sp.

(Figures 10, 11 and 12)

Types, male and female, from *Recurvirostra americana* Gmelin, collected by Charles Shaw at Ebano, San Luis Potosí, November 6, 1946.

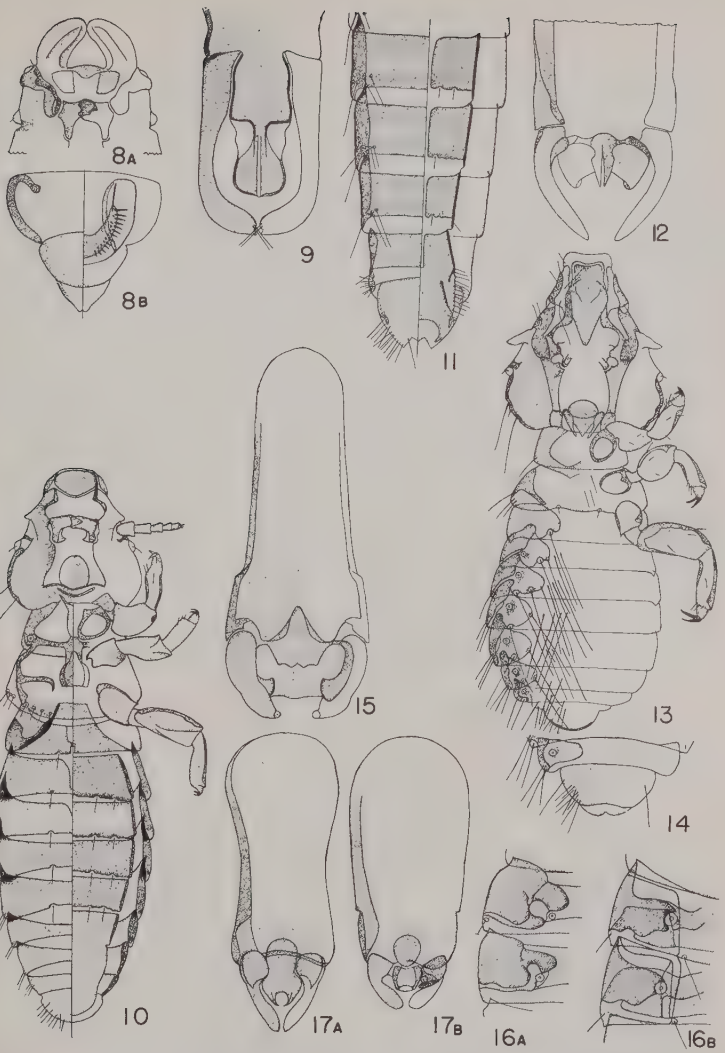


Fig. 8a. *Acidopractus hopkinsi mexicanus*, male, front and head
Fig. 8b. *A. h. mexicanus*, female, tip of abdomen
Fig. 9. *A. h. mexicanus*, male, genitalia
Fig. 10. *Cummingsiella inexpectata*, male
Fig. 11. *C. inexpectata*, female, abdomen, segments IV-VIII
Fig. 12. *C. inexpectata*, male, genitalia
Fig. 13. *Strigiphilus viridicus*, male
Fig. 14. *S. viridicus*, female, tip of abdomen
Fig. 15. *S. viridicus*, male, genitalia
Fig. 16a. *Brüella laticeps laticeps* (Piaget), male, pleurites III and IV
Fig. 16b. *B. l. prasina*, male, pleurites III and IV
Fig. 17a. *B. l. laticeps*, male, genitalia
Fig. 17b. *B. l. prasina*, male, genitalia

DIAGNOSIS.—This is the first species of *Cummingsiella* taken on the avian genus *Recurvirostra*, and the pair of types were among a large series of *Quadraceps testudinarius* Children, whose type host is *Recurvirostra americana*, so that there can be no question as to the authenticity of the host record.

The present species is so different from any of the other known species of the genus[2] that a full description of it is unnecessary. It may be recognized by the long, fairly slender, body, especially the long, slender abdomen of the female. The head is typical of the genus and resembles strongly that of *C. ovalis* (Scopoli), but the body is entirely different, the pterothorax being narrow, with straight, slightly divergent sides, and the abdomen long, very slender, and tapering to the tip on the female.

The structure of the abdominal sclerites is also unique, although of same general types as in *ovalis* and *longirostricola* in that their sternites are heavily chitinized and widely separated from the pleurites, but differ in that they are also divided medially. The chaetotaxy is very sparse with setae mostly short and weak.

The male genitalia are also quite different in the structure of the endomera (see figure). There is practically no difference in structure of head and thorax between the sexes, although the head is wider at the temples in the female, also segment I of the abdomen is the same while segments II and III are like IV and V, as shown in the figure of the female.

The head and thorax in the female are little larger than in male (see tables of measurements), but the abdomen is very much longer (1.91 x .61 against 1.19 x .545). The species is represented by the two types only.

MEASUREMENTS OF THE TYPES:

	Male		Female	
	Length	Width	Length	Width
Body	2.12	—	2.95	—
Head	.54	.51	.586	.597
Prothorax	.23	.40	.263	.412
Pterothorax	.28	.52	.326	.564
Abdomen	1.19	.545	1.91	.61
Antennae	.24	.054	.23	.06
Basal plate	.28	.13		
Paramers	.102	.123		
Endomera	.05	.08		

Ibidoecus bimaculatus (Mjöberg), 1910

Docophorus bimaculatus Mjöberg, Ark. Zool., vol. 6, no. 13, p. 125, figs. 70-72. Host: *Guara alba* (Linn.). See Carriker, 1947, Bol. Entom. Venezol, vol. 6, p. 121.

A series of 16 specimens of both sexes was taken on the type host collected by Charles Shaw at Tamuín, San Luis Potosí, September 16, 1946.

[2] I have not seen a description of *C. brevirostris* Blagoveshtchensky from *Numenius tenuirostris*.

These specimens agree exactly with specimens from the type host in the author's collection, from which the true host was determined, and the species redescribed and figured.

Ibidoecus bisignatus (Nitzsch), 1866

Docophorus bisignatus Nitzsch, in Giebel, Z. ges. NatWiss., vol. 28, p. 362. Host: *Plegadis f. falcinellus* (Linn.).

A single immature specimen of what I take to be this species was secured from *Plegadis falcinellus chihi* (Vieill.). It is not sufficiently developed to permit certain identification.

Ibidoecus ibero-americanus Eichler, 1943

Mem. Estud. Zoo. Mus. Univ. Coimbra, no. 140, p. 5. Host: *Ajaia ajaja* (Linn.).

A series of 23 specimens of both sexes of this species was taken from the type host collected by Charles Shaw at Pujal, San Luis Potosí, October 30, 1946.

These specimens are identical with a series in the author's collection taken from the same host in Colombia. I described this in 1947 under the name of *I. ajajus*, not having seen Eichler's paper published in 1943. The species is an outstanding one and is easily recognized.

Strigiphilus viridicus, n. sp.

(Figures 13, 14 and 15)

Types, male and female adults, from *Ciccaba virgata centralis* Griscom, collected by Robert J. Newman at Xilitla, San Luis Potosí, February 8, 1947.

In 1874 Giebel described *Docophorus virgo* (Insecta Epizoa, p. 79) from *Ciccaba virgata superciliaris* (Pelzeln) (Brazil).

Giebel's description of *virgo* certainly does not fit the specimens taken on *Ciccaba virgata* in Mexico and Colombia; hence, the systematic position of *virgo* is problematical. There are many points of difference, but the most striking are the shape of the temples, the trabeculae, the legs, the lack of "lateral bands" on the abdomen, and the proportions of the head. A comparison of Giebel's description of *virgo* with the species described below fully illustrates these differences. Piaget's description of *S. virgo* (Giebel) (Pediculines) is merely a condensation of Giebel, and he assuredly never saw the species or else he would have published a figure of it. Giebel's statement "Die schläfenecke hinter des Fühlerbucht tritt stark und stumpf hervor" or "lineis temporalibus rectis" cannot apply to the present species. Neither are the legs slender, the trabeculae "conical," nor the abdominal segments "immaculate."

The material from Mexican and Colombian specimens of *Ciccaba virgata* is typical of *Strigiphilus*, resembling strongly *S. syrnii* (Packard) from *Strix nebulosa*, but with a longer head, and it seems to be an undescribed form, a description of which follows.

DIAGNOSIS.—Nearest to *S. syrnii* (Packard) in structure and markings of head and prothorax, but the pterothorax differs considerably, as well

as the abdominal pleurites. The body length and length and width of head are close to *syrnii* in both sexes, but the pro- and pterothorax are shorter and the abdomen much narrower in both sexes. The posterior margin of the pterothorax in *syrnii* is strongly and evenly convex and bears three fairly strong setae on each side of median line, while in *viridicus* there is but *one*.

The pleurites are wider transversely and tergites shorter, but their general structure is the same, while the abdominal chaetotaxy is also similiar.

The paramers in *syrnii* are much narrower and taper apically, but the length is the same; the endomera is distinct, but its details cannot be distinguished in the single male I have of *syrnii*. The type series consists of the male holotype, female allotype, and 16 paratypes of both sexes.

MEASUREMENTS OF THE TYPES:

	Male		Female	
	Length	Width	Length	Width
Body	1.78	—	2.00	—
Head	.675	.597	.695	.62
Prothorax	.15	.36	.174	.36
Pterothorax	.163	.52	.174	.54
Abdomen	.90	.66	1.11	.76
Antennae	.22	.054	.24	.054
Basal plate	.26	.13		
Paramers	.077	.12		
Endomera	.08	.10		

Philopterus ocellatus (Scopoli), 1763

Pediculus ocellatus Scopoli, Ent. carniolica, p. 382. Host: *Corvus corone (sardonius)* Kleinschmidt.

Two males, a female and 2 nymphs from *Corvus corone brachyrhynchos*, collected by Rollin Baker at Attair, Texas, U. S. A., December 11, 1938.

Hopkins and Clay contend that the species of *Philopterus* found on the American Crow is the same as that from the European form, *sardonius*, and that *Docophorus corvi* Osborn is a synonym of *ocellatus* (Scopoli). Not having been able to compare material from the two hosts, I am not in a position to refute their statement and for the time being follow their decision.

Philopterus underwoodi (Carriker), 1903

Docophorus underwoodi Carriker, Univ. Nebraska Studies, vol. 3, p. 130, pl. 1, fig. 3. Host: *Psilorhinus mexicanus cyanogenys* Sharpe.

A series of 48 males and females of what is apparently this species was taken on *Psilorhinus morio* (Wagler) collected by Marcella Newman at Xilitla, San Luis Potosí, January 27, 1947.

A very careful comparison was made between these specimens and the types of *P. underwoodi*, and while there are certain very small differences,

they do not seem of nomenclatural value. The genitalia, the sternal plates in both sexes, head structure, and chaetotaxy are all exactly the same. The two hosts are closely related, and all of the species of *Philopterus* parasitic on the Corvidae are very similar in many ways, so that it is not so unusual to find the same species of *Philopterus* on two hosts of the same genus, as in the case of the preceding species, *P. ocellatus*.

Eustrigiphilus ceblybrachys (Denny), 1842

Docophorus ceblybrachys Denny, Mon. Anopl. Brit., pp. 45 and 92, pl. I, fig. 3. Host: *Nyctea scandiaca* (Linn.); *Eustrigiphilus ceblybrachys*, Ewing, 1926.

Three females of this characteristic species were taken on the type host collected by C. Honey. Compared with material in my own collection from the type host, they prove to be the same. I am not prepared to follow Hopkins and Clay in making *Eustrigiphilus* Ewing a synonym of *Strigiphilus* Mjöberg. If *Eustrigiphilus* cannot be recognized, neither can *Cummingsiella* be separated from *Quadraceps*, as well as other cases which could be cited.

Chelopistes meleagridis (Linn.), 1758

Pediculus meleagridis Linn., Syst. Nat., ed. 10, p. 613. Host: *Meleagris gallopavo domestica*.

A series of 12 specimens of both sexes taken on *Meleagris gallopavo intermedia*, collected by Rollin Baker in Kenedy Co., Texas, December, 1941. When this material was compared with Miss Clay's description and figures of the species and with my own material from the domestic turkey, no differences were to be noted. It is a well-marked species, quite different from all the other species of the genus I have seen and, in my opinion, not congeneric with the species described by me from the Cracidae and *Odontophorus*.

Physconelloides zenaidurae (McGregor), 1917

Goniodes zenaidurae McGregor, Ent. News, vol. 28, p. 433, pl. 28, figs. 1, 4. Host: *Zenaidura macroura marginella* (Woodhouse).

Five females of this species were taken on *Zenaidura macroura carolinensis*, collected by D. S. Farner at Lawrence, Kansas, U. S. A. These specimens agree with McGregor's description and figures and also with a female in my own collection from the same host taken in Ohio. The genus *Physconelloides* is a very homogenous one, with species differing but slightly from each other, so that very careful comparison must be made with the known forms before describing new ones.

Quadraceps hemichrous (Nitzsch), 1866

Nirmus hemichrous Nitzsch, in Giebel, Z. ges. NatWiss., vol. 28, p. 372. Host: *Himantopus h. himantopus* (Linn.).

Four males and 3 females were taken on *Himantopus mexicanus* (P. L. S. Müller), collected by Robert J. Newman at Tamuín, San Luis Potosí, November 17, 1946. I have previously compared material of this species taken on *H. h. mexicanus* with specimens of authentic *hemichrous* from Europe and find them to be identical.

Quadraceps hospes (Nitzsch), 1866

Nirmus hospes Nitzsch, in Giebel, Z. ges. NatWiss., vol. 28, p. 371. Host: *Squatarola squatarola* (Linn.).

Two males and 3 females were taken on the type host collected by Charles Shaw at Ebano, San Luis Potosí, November 1, 1946. I have not been able to compare these specimens with authentic material of the species, but from the available data there seems to be no question as to the correctness of the identification.

Quadraceps testudinarius (Children), 1836

Nirmus testudinarius Children, Back's Arctic Land Exped., p. 538. Host: *Recurvirostra americana* Gmelin.

Twenty-four males and females of the species were taken from the type host collected by Charles Shaw at Ebano, San Luis Potosí, November 6, 1946. Children's brief Latin description of this species leaves much to the imagination. However, what he does say agrees with the material examined. I had previously taken specimens on the type host, which were compared with the Mexican material and found to be the same.

Oxylipeurus corpulentus Clay, 1938

Proc. Zool. Soc. London, (B), vol. 108, p. 183, figs. and pl. 12, fig. 1. Host: *Meleagris gallopavo merriami* Nelson.

Seven females were taken on *Meleagris gallopavo intermedia* Sennett, collected by Rollin Baker in Kenedy Co., Texas in December, 1941. This material agrees perfectly with Miss Clay's description and figures of the species. Unfortunately there were no males.

Oxylipeurus chiñiri vetulae Carriker, 1944

Rev. Bras. Biol., (4) 4, December, p. 579, figs. 50-53. Host: *Ortalis v. vetula* (Wagler).

A large series of *Oxylipeurus* was take on *Ortalis vetula mccalli* (Baird) at Xilitla, San Luis Potosí. When the material was compared with the type series of *O. c. vetulae* Carriker, some very slight differences were noted, but they are not, in my opinion, worthy of nomenclatural recognition.

The two hosts *O. v. vetula* and *O. vetula mccalli* are very closely related, so that it would hardly seem probable to find a difference in their Mallophagan parasites.

Cuculicola atopa (Kellogg), 1899

Nirmus atopus Kellogg, 1899, Occ. Pap. California Acad. Sci., vol. 6, p. 18, pl. 2, fig. 4. Host: *Piaya cayana thermophila* P. L. Sclater.

Fifty specimens of both sexes were taken apparently on a single example of the type host collected by Robert J. Newman at Xilitla, San Luis Potosi, February 11, 1947.

I have examined specimens of this parasite from numerous races of *Piaya cayana*, collected from Mexico to Peru, and there seems to be practically no difference between them. This species of parasite is apparently a remarkably stable form.

Brüelia laticeps prasinus, n. subsp.

(Figures 16a, 16b, 17a and 17b)

Types, male and female adult, from *Aulocorhynchus p. prasinus* (Gould), collected by Robert J. Newman at Xilitla, San Luis Potosí, February 7, 1947.

DIAGNOSIS.—Close to the nominate race from *A. atrogularis* (Peru), with which it has been compared. In general appearance the two are very similar and may be recognized at a glance by the unusual head structure and abdominal pleurites, the former of the type of *B. marginella* (from the motmots), and the latter characteristic of this species.

Examples of *B. laticeps* have been taken on numerous species of toucans. All are, apparently, conspecific, but they are divisible into an undetermined number of subspecies. Piaget's figure of *laticeps* is correct and needs little elaboration. The present race differs from the nominate form as follows (measurements of males only are compared, no female of the nominate race having been taken): head wider at temples (.43 x .51 against .445 x .49); pterothorax wider, length the same (.467 against .434); abdomen longer and much wider (.976 x .75 against .915 x .67); basal plate wider and of distinct shape; paramers shorter and endomera quite different (see figures).

There is considerable difference in the structure of the pleural incrassations (see figures) and in the apical portion of the basal plate. The subspecies is represented by the male holotype, female allotype, and 9 female paratypes.

MEASUREMENTS OF THE TYPES:

	Male		Female	
	Length	Width	Length	Width
Body	1.59	—	1.91	—
Head	.43	.51	.456	.564
Prothorax	.13	.314	.174	.31
Pterothorax	.195	.434	.195	.50
Abdomen	.915	.67	1.14	.846
Antennae	.195	.035	.217	.043
Basal plate	.225	.10		
Paramers	.068	.078		
Endomera	.053	.048		

Brüelia picturata (Osborn), 1896

Nirmus picturatus Osborn, 1896, Bull. U. S. Bureau Ent. (n. s.), no. 5, p. 226. Host: *Sturnella m. magna* (Linn.).

Eight females (2 juv.) and 1 male were taken on the type host collected at Garnett, Anderson Co., Kansas, U. S. A., by H. W. Setzer, March 22, 1947. This is a very strikingly marked species, with pitchy black markings on a clear ground. It is a common type of the genus found on the Icteridae.

Brüelia marginella (Nitzsch), 1866

(Figures 18 and 19)

Nirmus marginellus Nitzsch, Zeit. ges. NatWiss., p. 368. Host: *Momotus momota* (Linn.), Piaget, Pediculines Suppl., p. 21, pl. III, fig. 1; Giebel, Insecta Epizoa, p. 147, pl. VI, fig. 5.

I have examined a large series of this species taken from seven subspecies of *Momotus momota*, ranging from Peru to northern Mexico, and a single female from *Barypthengus semirufus* from Colombia. I have a pair of the parasites taken on *Momotus m. momota*, from the upper Río Caura in Venezuela, which we must consider as the type host for the species. The whole series is clearly conspecific but may be separated into various subspecies, the specimen from *Barypthengus* being the farthest removed from the typical form.

A study of the literature covering the species is somewhat confusing. Giebel's description and figure undoubtedly represent this species, but it is difficult to reconcile Piaget's figure with Giebel's, or with the actual specimens of the parasite. In Piaget's figure the head is not only of a different shape but is very much larger than it should be in proportion to the size of the insect. The pterothorax is not pointed medially on the posterior margin, as shown by Piaget, but is flatly convex. There are so many details in both his description and figure that do not agree with the actual specimens of *marginellus* that I am inclined to believe that his single female came from some other host, not *Momotus*.

I herewith present a figure of the female taken on the type host; also shown is the male genitalia. The resemblance of my drawings to Giebel's figure is at once apparent.

A single male from *M. m. chlorolaemus* (Peru) is very close to the Venezuelan pair from *M. m. momota* and cannot be separated, as well as six specimens from *M. m. spatha* (Goajira Peninsula, Colombia), and 8 from *M. m. subrufescens* (N. E. Colombia).

The large series from northern Mexico, from *M. m. caeruleiceps*, however, differs sufficiently from the Venezuelan pair to merit subspecific rank, and is described below. The 2 males and 5 females from *M. m. lessoni* (Costa Rica) are too close to the Mexican series to be separated from it, while nine specimens from *M. m. reconditus* (Panamá-Colombia frontier) are more or less intermediate but have certain distinctive characters and possibly may be separable. Moreover, the single female from *Barypthengus* seems to be different in the shape of its head and the pattern of the incrassations on the pleurites.

Brüelia marginella xilitla, n. subsp.

(Figures 20a and 20b)

Types, male and female adults, from *Momotus momota caeruleiceps* (Gould), collected by Robert J. Newman at Xilitla, San Luis Potosí, February 12, 1947.

DIAGNOSIS.—Very close to the nominate form, differing only in certain measurements, chaetotaxy, and the shape of incrassations on the pleurites and on the head. The single male which I have of the nominate race is

not in condition for comparison with the Mexican material as to size. It is either an unusually small specimen or shrunken in clearing (probably both). As regards the female, the differences between it and the new form are the following: the head measures exactly the same; the prothorax and pterothorax are longer and narrower; the abdomen longer and wider. The clypeal bands differ in shape (see figure), as well as the markings on the pleurites. There are about nine long, strong hairs on each side of the posterior margin of the pterothorax (in addition to one at angle), while in *marginella* there are but five on the margin and two in the angle, all shorter. The setae of the abdomen are all longer in the new form, especially the three in the median, lateral portion of the pleurites and the single long, pustulated hair on posterior margin of tergites II to VI. The male genitalia seem to be about the same. There is considerable variation in the shape of the apical portion of the paramers in the Mexican series, some being like *marginella* and others different, so that they cannot be used for comparison.

The race is not a strongly marked one, but the differences listed are constant. The type series consists of the male holotype, female allotype, 7 male and 7 female paratypes.

MEASUREMENTS OF THE TYPES:

	Male		Female	
	Length	Width	Length	Width
Body	1.92	—	2.45	—
Head	.586	.597	.586	.62
Prothorax	.185	.34	.205	.345
Pterothorax	.22	.54	.25	.564
Abdomen	1.08	.716	1.41	.78
Antennae	.26	.048	.27	.058
Basal plate	.21	.08		
Paramers	.06	.066		
Endomera	.051	.046		

Brüelia subtilis (Nitzsch), 1874

Nirmus subtilis Nitzsch, in Giebel, Insecta Epizoa, p. 137. Host: *Passer m. montanus* and *P. d. domesticus* (Linn.).

Seventeen specimens of both sexes, of what seems to be this species, were taken on *Passer domesticus*, collected by L. Lipovosky at Lawrence, Kansas, May 21, 1947.

Apparently this species is very close to *B. cyclothorax* (Burm.). Just what the differences are I am not quite certain, and both have been recorded from *Passer montanus*, but only *subtilis* from *P. domesticus*. A comparison of the present specimens (which are in poor condition) with Denny's and Giebel's description and figure of *cyclothorax* shows that they apparently are not that species but another closely related one, which can only be *B. subtilis* (Nit.). The species is characterized by the long, tapering pre-

antennary area of the head, by the apparent absence of deeply chitinized pleurites, and by the rather deeply colored sternites that do not extend to the pleurites. These specimens are not in condition to be properly described, being either immature or left too long in the clearing solution.

Pseudolipeurus longipes similis Carriker, 1944

Proc. U. S. Nat. Mus., vol. 95, p. 91, fig. 2b. Host: *Crypturellus b. boucardi* (P. L. Sclater).

A single pair of this species was taken on *Crypturellus cinnamomeus mexicanus* (Salvadori), collected by George H. Lowery at Naranjo, San Luis Potosí, February 15, 1948.

I have made a very complete comparison between this pair of parasites and the types of *P. longipes similis*, and whatever minute differences there may be are entirely too small to merit consideration. There is a very slight difference in the shape of the clypeal signature, but not sufficient to be of systematic value. The characters most commonly used for separating the species and subspecies of this genus are: the shape of the head, the antennae, the clypeal signature, the male genitalia, and the apical abdominal segments in both sexes. In all of these characters the parasites in question agree perfectly with specimens from *C. b. boucardi*. A reexamination of the single male taken by me on *Crypturellus cinnamomeus sallaei*, at Tres Zapotes, Veracruz, México, and referred by me to this species in my 1944 report (p. 91), and comparison with the pair mentioned above, confirms my previous statement as to its nomenclatural status. It agrees perfectly with the male from San Luis Potosí.

Pseudophilopterus hirsutus similis Carriker, 1944

Proc. U. S. Nat. Mus., vol. 95, p. 103, figs. 4e and f. Host: *Crypturellus cinnamomeus sallaei* (Bonaparte).

One male and 3 females were taken on *Crypturellus cinnamomeus mexicanus* (Salvadori), the same individual host as given under the preceding species, as well as from another example of this host collected at Rio Axtla by Robert J. Newman, April 21, 1947.

There are no discernible differences between these specimens and the types of *P. h. similis* from *C. c. sallaei*.

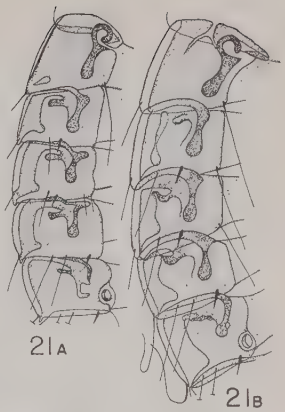
FAMILY HEPTAPSOGASTRIDAE

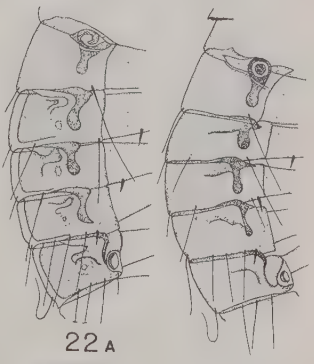
Strongylocotes interruptus[3] **fimbriatus** Clay, 1937

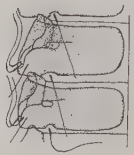
Strongylocotes complanatus fimbriatus Clay, Proc. Zool. Soc. London, p. 156, pl. 4, fig. 3. Host: *Crypturellus c. cinnamomeus* (Lesson).

Two nymphs of what are doubtless this species, were taken on the same host as the two preceding species, collected by George H. Lowery at Naranjo, San Luis Potosí. They are too young for comparison, but considering the relationships between the other Mallophagan species of this group of hosts, I do not hesitate in calling them *fimbriatus*.

[3] The systematic arrangement used in this paper follows a revision of the genus in another paper now in press.







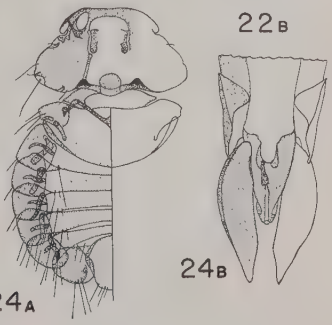


Fig. 18. *Brüella marginella marginella* (Nit.), female
Fig. 19. *B. m. marginella* (Nit.), male, genitalia
Fig. 20a. *B. marginella xilitla*, female, head
Fig. 20b. *B. m. xilitla*, female, pleurites and tergites IV and V
Fig. 21a. *Heptapsogaster mandibularis idoneus*, male, pleurites I to V
Fig. 21b. *Heptapsogaster mandibularis cinnamomeus*, male, pleurites I to V
Fig. 22a. *Heptapsogaster inexpectata potosii*, male, pleurites I to V
Fig. 22b. *H. i. magdalenae* Carr., male, pleurites I to V
Fig. 23. *H. i. potosii*, male genitalia
Fig. 24a. *Discocorpus multiplex secundus* Clay, male
Fig. 24b. *D. m. secundus*, male, genitalia

Rhopaloceras h. heterogenitalis Carriker, 1944

Proc. U. S. Nat. Mus., vol. 95, p. 136, figs. 10a, b, and e. Host: *Crypturellus b. boucardi* (P. L. Sclater).

A single female was taken on the same host as the preceding species, collected by Robert J. Newman at Río Axtla, April 21, 1947.

This female is exactly like the female allotype of *heterogenitalis* in the shape of the head and the apical abdominal segment, the latter being characteristic of the species. It has the same spicule-covered sac surrounding the apical portion of the genitalia, the two setae set in a clear area on each side of the median portion (dorsal), and the same identical structure of the anterior portion of the sternal plate. However, without the male sex the identification cannot be positive. The only difference discernible is in the structure and chaetotaxy of the meso-sternal plate, but this difference is not great and may very well fall within the range of individual variation.

Heptapsogaster temporalis acutiventris Clay, 1937

Proc. Zool. Soc. London, (B), p. 135, fig. 4a, pl. I, figs. 1, 2. Host: *Crypturellus cinnamomeus mexicanus* (Salvadori).

A single male taken on the type host (same individual as for preceding species).

Heptapsogaster mandibularis cinnamomeus, n. subsp.

(Figures 21a and 21b)

Type, adult male, from *Crypturellus cinnamomeus mexicanus* (Salvadori), collected by Robert J. Newman at Río Axtla, San Luis Potosí, México, April 21, 1947.

DIAGNOSIS.—This race is very close to *H. m. idoneus*, from *Crypturellus idoneus* of Colombia. The whole body is wider in all segments, but the length of head and thoracic segments is the same, while the abdomen is longer and wider (.76 x .716 against .68 x .64). The male genitalia are

MEASUREMENTS OF THE TYPE:

		Length	Width
Body		1.41	—
Head	*frons*	—	.35
	temples	.424	.61
	occiput	.38	—
Prothorax		.152	.326
Mesothorax		.163	.597
Metathorax		.13	.586
Abdomen		.76	.716
Paramers		.133	.092
Endomera		.123	.054

practically the same, the only difference being in the paramers, which are slightly shorter and narrower, but this difference is small (.133 x .092 against .143 x .114). However, the pleural incrassations are quite different, so that this character together with wider body and longer abdomen seem to be sufficient for subspecific recognition.

The race is represented by a single male, the holotype.

Heptapsogaster inexpectata[4] **potosii**, n. subsp.

(Figures 22a, 22b, and 23)

Types, male and female adults, from *Crypturellus cinnamomeus mexicanus* (Salvadori), collected by Robert J. Newman at Río Axtla, San Luis Potosí, México, April 21, 1947.

DIAGNOSIS.—Very similar to *H. i. magdalenae* Carriker, from *Crypturellus idoneus* (Colombia), differing only in small subspecific characters. The measurements for the male are practically the same, with the exception of a slightly longer abdomen (.61 x .63 against .56 x .63); longer and wider paramers and wider endomera (paramers, .13 x .09 against .09 x .07; endomera, .11 x .043 against .11 x .033). The genital sternite and segment VII in the female are exactly the same shape as in *magdalenae*, but the pleural incrassations differ considerably in both sexes (see figure). The scent gland in the male is the same, as well as shape of pleurite V to which it is attached.

MEASUREMENTS OF THE TYPES:

	Male		Female	
	Length	Width	Length	Width
Body	1.19	—	1.39	—
Head: *frons*	—	.29	—	.345
Head: temples	.38	.477	.395	.52
Head: occiput	.337	—	.35	—
Prothorax	.13	.293	.13	.303
Mesothorax	.132	.51	.15	.52
Metathorax	.13	.50	.14	.49
Abdomen	.61	.63	.803	.66
Antennae	.22	.054	.185	.035
Paramers	.13	.09		
Endomera	.11	.043		

Species represented by the male holotype, female allotype, and 2 male and 2 female paratypes.

[4] I do not consider that *Heinrothiella inexpectata* Eichler, 1942, is congeneric with *Heptapsogaster;* therefore, there is no necessity for replacing *Heptapsogaster inexpectatus* Carriker, 1944, with *H. insperatus* Hopkins, 1950.

Megapoestus multiplex secundus Clay, 1937

Proc. Zool. Soc. London, p. 150, figs. 9b and 10b. Host: *Crypturellus cinnamomeus mexicanus* (Salvadori).

Five males and 5 females were taken from the same individual host mentioned under the previous species, as well as from the bird collected at Naranjo. These specimens are from the type host and agree perfectly with Clay's description and figures. (See remarks by the author on this species in Stud. in Neotr. Mall. III, p. 189.)

Discocorpus cephalosus mexicanus, n. subsp.

(Figure 24)

Type, male adult, from *Crypturellus cinnamomeus mexicanus* (Salvadori), collected by George H. Lowery at Naranjo, San Luis Potosí, February 15, 1948.

DIAGNOSIS.—This race is nearest to *D. c. intermedius*, from *Crypturellus idoneus* (Colombia), with which it agrees in the size and shape of the head, shape of the thorax, type of incrassations on the pleurites, and in general shape of paramers, but differs in the details of some of these characters, especially in the male genitalia.

The only differences in measurements [5] worthy of note are: metathorax, .15 x .454 against .17 x .44; paramers, .123 x .08 against .087 x .07; and endomera, .08 x .043 against .06 x .03. Pleurites I to V are thickly covered (especially on outer half) with tiny, round depressions, or pits, about .006 in diameter. These pits are present on all known species of the genus, but the fact has not heretofore been noted. There is considerable variation in the amount of these pits present. In *furculus* they are found not only on the pleurites but also on the tergites and portions of the head, while in the present race they are restricted to pleurites I to V.

By a comparison of the figures of the genitalia of the three other subspecies in this genus (Stud. in Neotr. Mall. III, 1944, p. 193) the differences will at once be apparent. It will also be noted that the pleural incrassations are quite different from those of *D. c. cephalosus* (Stud. in Neotr. Mall. I, 1936, pl. 25, fig. 1), as well as from *microgenitalis* (*cf.*, pl. 24, fig. 2). The race is represented by the male holotype only.

Heterogoniodes arcaeceps Clay, 1937

Proc. Zool. Soc. London, p. 152, fig. II. Host: *Crypturellus cinnamomeus mexicanus* (Salvadori).

Four females of this interesting species were taken on the type host collected by Robert J. Newman at Río Axtla, April 21, 1947. No males were secured. There can be no doubt of the identity of the species, since the specimens came from the type host. Only three species of this interesting genus are known, all from the genus *Crypturellus*.

---

[5] Complete measurements are not given since they are so close to those of *intermedius*, while the worthwhile differences are noted above.

Pectenosoma verrucosa cinnamomea Carriker, 1944

Proc. U. S. Nat. Mus., vol. 95, p. 202-205. Host: *Crypturellus cinnamomeus sallaei* (Bonaparte).

A single female of what seems to be this race of *P. verrucosa* was taken on *Crypturellus cinnamomeus mexicanus*, collected by George H. Lowery at Naranjo, San Luis Potosí, February 15, 1948.

A careful comparison of this single female with the female allotype of *cinnamomea* shows no differences except some very small ones easily falling under individual variation.

Austrokellogia coniceps cinnamomea, n. subsp.

Type, male adult, from *Crypturellus cinnamomeus mexicanus* (Salvadori), collected by George H. Lowery at Naranjo, San Luis Potosí, México, February 15, 1948.

DIAGNOSIS.—This race of *A. coniceps* is very close to *boucardi* Carriker, from *Crypturellus boucardi*. The genitalia are indistinguishable, not only in structure but also in measurements (paramers, .14 x .068 against .15 x .072; endomera, .087 x .045 against .087 x .04).

The body measurements, however, show considerable differences as follows: length much less (1.46 against 1.65); head, temples, .48 x .595 against .52 x .65; *frons* same; length at occiput less. The prothorax and mesothorax are very close to *boucardi* in length and width, but the metathorax is shorter and narrower (.14 x .39 against .195 x .41); the abdomen is much smaller (.846 x .825 against .976 x .89).

The shape of the apical abdomen segment also differs, as well as the tubercles on each side of it. It is unfortunate that no females were secured to compare with three females taken by me on *Crypturellus cinnamomea sallaei*, south of Veracruz, and noted by me (Stud. in Neotr. Mall. III, 1944, p. 227). It is possible that they are the same thing, but without having the other sex in both cases I cannot decide with certainty.

The difference in body measurements between this form and *boucardi*, outside of those noted above, are so small that a complete table does not seem necessary.

From the above list of species it will be noted that we have here ten genera and twelve species of Mallophaga from a single host, *Crypturellus cinnamomeus mexicanus*, four of which have not been previously described. It must be admitted, however, that all of these species were not taken on the same individual host, but on *two birds*.

Five species were taken on the Naranjo bird, five different species on the Río Axtla host, and two species only on both birds. The above data illustrate very clearly the necessity for very careful collecting on *all* specimens of tinamous taken, even from the same locality, since it is very rare that any two specimens will yield the same species of Mallophaga.

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MINUTES OF THE THIRTY-SEVENTH ANNUAL MEETING of the FLORIDA ENTOMOLOGICAL SOCIETY

The thirty-seventh annual meeting of the Florida Entomological Society was held in the Ball Room of the Manatee River Hotel, Bradenton, during September 2nd and 3rd, 1954. The meeting opened at 10:00 a.m., September 2nd, with the presidential address given by Dr. D. O. Wolfenbarger. Twenty-two papers were presented before the Society, including a group of invitational papers on the subject "Progress in Florida Entomology".

A most enjoyable hospitality hour was provided by Industry followed by an excellent steak roast in the park adjoining the hotel.

The business meeting was called to order by President Wolfenbarger at 3:45 p.m., September 2nd. The first order of business was a report from the committee appointed to invite the Experiment Station pathologists to the 1954 meeting. Mr. Dick Voorhees reported for the committee that our meeting conflicted with the National Pathological meeting. In his report he suggested we could do one of three things: (1) invite the plant pathologists to meet with us one day next year; (2) invite the plant pathologists to hold their meeting at the same place and time that we meet; or (3) we could drop the idea of trying to get the plant pathologists to form a group similar to our own. President Wolfenbarger listed several of the joint problems of the entomologists and plant pathologists, such as disease transmission, spray programs, etc., and said it would be helpful if the two groups could meet together. He opened the floor for discussion. Mr. Herman Mayeux asked if the plant pathologists were interested in meeting with us. Mr. Voorhees said he did not know — that the plant pathologists whom he had talked with did not seem very interested in the idea of meeting with the entomologists. Dr. Kuitert asked that the Secretary read the minutes of the last meeting in regards to the appointing of the committee. The minutes were read. After much discussion, Dr. J. T. Griffiths moved the President be empowered to invite the organized plant pathologists and all other interested that attend their meetings to our next meeting and to give papers of joint interest. The motion passed.

President Wolfenbarger called for the report of the Membership Committee. Dr. H. V. Weems reported that 55 new members had joined the Society since the last meeting. The committee recommended three names for honorary membership, giving a brief resume of their accomplishments, and moved they be so honored. Mr. George Merrill seconded the motion. Dr. J. W. Wilson asked the voting to be by secret ballot and be done at the business meeting on September 3rd. After a discussion his request was approved by the Society.

Under new business, Dr. M. W. Provost asked if the Society could publish supplements to the FLORIDA ENTOMOLOGIST. Dr. Lewis Berner, the Editor, said the present constitution did not authorize such publications. Dr. Berner moved that the Executive Committee study the possibility of the Society publishing supplements from time to time of papers of too long a nature to be published in the FLORIDA ENTOMOLOGIST, and whether steps should be taken to allow such publications. The motion passed.

The business meeting of September 2nd then adjourned at 4:30 p.m.

BUSINESS MEETING OF SEPTEMBER 3RD

The business meeting of September 3rd opened at 11:05 and the first order of business was the election of honorary members. An election committee composed of Dr. A. J. Rogers, Dr. Donald Deleon and C. R. Stearns, Jr., was in charge of the voting. The three honorary members were elected. They are Mr. K. E. Bragdon, Mr. A. C. Brown and Dr. W. V. King.

President Wolfenbarger called for the report of the Resolutions Committee. The committee consisting of F. S. Chamberlin, Chairman, C. L. Remington and Norman C. Hayslip submitted the following resolutions:

Be it Resolved by the Florida Entomological Society:

1. That we record with sincere regret the passing of J. C. Goodwin who served Florida for many years as Nursery Inspector. His family has our deepest sympathy.
2. Our Society expresses its appreciation to the officers, individuals, and committees who contributed toward the most informative and enjoyable 37th Annual Meeting at Bradenton. The Arrangements Committee consisted of E. G. Kelsheimer, R. E. Waites, and T. H. Jacoway. Herbert Spencer and Herman Mayeux served on the Program Committee. To industry goes our thanks for a most delightful social hour. The management of the Manatee River Hotel has our appreciation for the many courtesies

extended to us. Our expression of appreciation also goes to the Bradenton Chamber of Commerce for car stickers which permitted free parking.

Dr. L. C. Kuitert moved the resolutions be adopted as read provided the Secretary informs Mrs. Goodwin of the Society's action. Seconded by Mr. George Merrill. The resolutions as amended were adopted.

Dr. Wolfenbarger called for the Treasurer's report. Mr. W. P. Hunter gave the following report:

REPORT OF THE TREASURER-BUSINESS MANAGER FOR THE YEAR ENDING AUGUST 23, 1954

Receipts:

Residue from registration fees, etc., Miami meeting	$ 30.51
Residue from Hospitality Hour, etc., Miami meeting	485.00
From membership dues and subscriptions	735.84
From reprints and plates	203.05
From sale of back numbers and sets of FLORIDA ENTOMOLOGIST	214.70
From advertisements in the FLORIDA ENTOMOLOGIST	748.00
Balance on hand August 31, 1953	491.97
GRAND TOTAL	$2,909.07

Expenditures:

To Pepper Printing Co., Gainesville, Fla.	$1,436.84
Pahokee News, Pahokee, Fla. (500 programs)	22.66
Dr. J. M. Bellows (Remuneration for funds spent on behalf of the Society at Miami, Fla.)	426.44
To Gainesville Letter Shop, Gainesville, Fla.	17.72
To U. S. Postmaster, Gainesville, Fla.	63.09
Refunds to subscribers and/or members	1.00
Miscellaneous typing and steno work	18.15
Parker Office Machine Co. (Misc. Office Supplies and Steel Filing Cabinet)	125.11
To Kilgore Seed Co., Gainesville, Fla. (Use of Phone)	4.07
To W. P. Hunter (Refund for Misc. Postal Expenses)	16.25
To bank charges of all types	6.28
Balance on hand August 23, 1954	771.46
GRAND TOTAL	$2,909.07

Mr. George Merrill, Chairman of the Auditing Committee, reported his committee had checked the records of the Treasurer and they were found in order.

President Wolfenbarger called for new business. Dr. J. T. Griffiths proposed the section of the constitution dealing with honorary membership be amended. Dr. Wolfenbarger asked the Secretary to read the constitution concerning constitutional

amendments. The steps required for amendment were read and explained by the Secretary. Dr. Griffiths then proposed the incoming President appoint the necessary special committee to consider an amendment of the constitution in regards to honorary membership. He read to the Society and submitted a copy to the Secretary of a proposed revision of Article III, Membership, Section 2 for consideration by the committee.

Mr. Mayeux spoke on the excellent steak roast the local committee arranged in place of the annual banquet, and said he thought the committee should be complimented for their excellent work. President Wolfenbarger suggested the new committee on arrangements pick an air-conditioned room for the 1955 meeting. He also brought up the subject of the hospitality hour. Mr. C. L. Remington suggested a committee be appointed to ask Industry in advance of the meeting for funds for the Treasury to be used for this activity. No action was taken on Mr. Remington's suggestion. Dr. J. W. Wilson brought up the 1955 meeting of the Cotton States Branch of the National Society which is to be held in Tampa. He moved the incoming President appoint a committee to offer the services of the Florida Entomological Society to the Cotton States Branch. Motion passed.

President Wolfenbarger called for the report of the Nominating Committee, consisting of Dr. Maurice W. Provost, W. G. Genung and Philip Arey. The committee suggested the following names:

President	F. G. Butcher
Vice President	F. S. Chamberlin
Secretary	Milledge Murphey, Jr.
Editor	Lewis Berner
Associate Editor	L. C. Kuitert
Exec. Committee Member	A. J. Rogers

President Wolfenbarger called for nominations from the floor. Dr. L. A. Hetrick moved the Secretary be instructed to cast a unanimous ballot for the slate as proposed by the Nominating Committee. The motion passed.

The new President was escorted to the stand. Dr. Butcher thanked the Society for the honor that had been bestowed on him.

The business meeting was adjourned at 11:50 a.m.

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Chinch Bugs	Silverfish
Cockroaches	Sod Webworms
Cotton Boll Weevils	Southern Corn Rootworms
Crickets	Strawberry Crown Borers
Cutworms	Strawberry Weevils
Earwigs	Sweet Clover Weevils
Fleas	Tarnished Plant Bugs
Flies	Termites
Grasshoppers	Ticks
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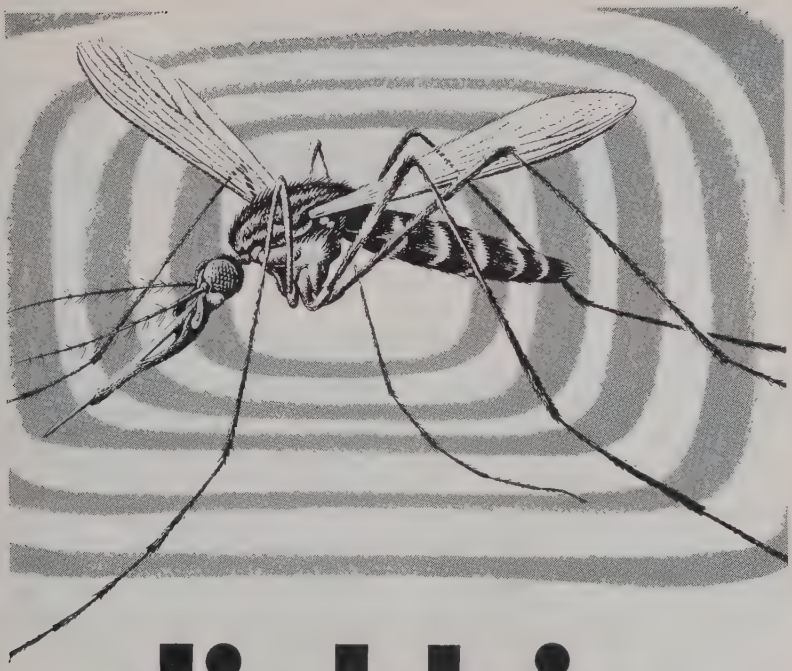

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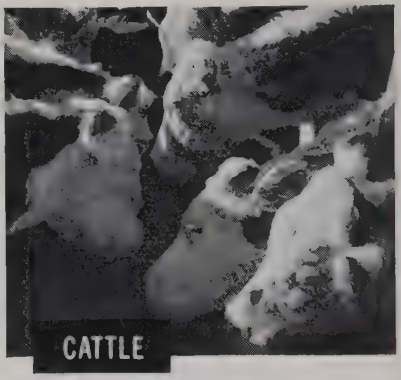

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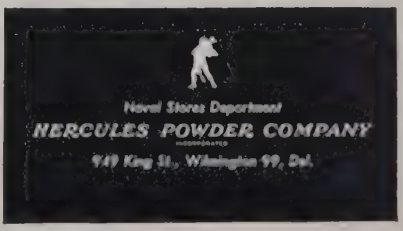

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